

CLAIMS

What is claimed is:

1 1. A tunable capacitive bridge configured to couple a ladder network comprising  
2 coupling elements and a plurality of shunt elements, the tunable capacitive bridge comprising:  
3 a first tunable capacitor coupled in parallel with a coupling element, a first end of the  
4 first tunable capacitor coupled with a first shunt element and a second end of  
5 the first tunable capacitor coupled with a second shunt element; and  
6 a second tunable capacitor and a third tunable capacitor coupled in parallel with the  
7 first tunable capacitor,  
8 a first end of the second tunable capacitor coupled with the first end of the  
9 first tunable capacitor and the first shunt element, and  
10 a first end of the third tunable capacitor coupled with the second end of the  
11 first tunable capacitor and the second shunt element.

1 2. The tunable capacitive bridge of claim 1, wherein the second end of the second  
2 tunable capacitor couples with a ground.

1 3. The tunable capacitive bridge of claim 1, wherein the second end of the third tunable  
2 capacitor couples with a ground.

1 4. The tunable capacitive bridge of claim 1, wherein the first tunable capacitor  
2 comprises a thin-film barium strontium titanate ("BST") capacitor.

1 5. The tunable capacitive bridge of claim 1, wherein the second tunable capacitor  
2 comprises a thin-film barium strontium titanate ("BST") capacitor.

1 6. The tunable capacitive bridge of claim 1, wherein the third tunable capacitor  
2 comprises a thin-film barium strontium titanate ("BST") capacitor.

7. The tunable capacitive bridge of claim 1, wherein each of the first tunable capacitor, the second tunable capacitor, and the third tunable capacitor comprises a thin-film barium strontium titanate ("BST") capacitor.

8. The tunable capacitive bridge of claim 1, wherein at least one shunt element comprises a reactive element.

9. The tunable capacitive bridge of claim 1, wherein at least one shunt element comprises a small section transmission line.

10. A tunable capacitive bridge configured to couple a ladder network comprising a coupling element coupled in parallel with a shunt element, the tunable capacitive bridge comprising:

a first tunable thin-film barium strontium titanate ("BST") capacitor coupled in parallel with the coupling element and the shunt element; and  
a second tunable thin-film BST capacitor and a third tunable thin-film BST capacitor coupled in parallel with the first tunable thin-film BST capacitor and the coupling element and the shunt element.

11. The tunable capacitive bridge of claim 10, wherein the coupling element comprises one of a resonant and a non-resonant element.

12. The tunable capacitive bridge of claim 10, wherein the coupling element comprises at least one from a group consisting of a capacitor, inductor, a resistor, and a transmission line.

13. The tunable capacitive bridge of claim 10, wherein the shunt element comprises at least one from a group consisting of a capacitor, an inductor, a resistor, and a transmission line.

1 14. The tunable capacitive bridge of claim 10, wherein the second tunable thin-film BST  
2 capacitor and the third tunable thin-film BST capacitor couple with a ground.

1 15. The tunable capacitive bridge of claim 10, wherein the shunt element couples with a  
2 ground.

1 16. A tuning circuit comprising:  
2 a bridge circuit comprising a first adjustable capacitance grouping, a second  
3 adjustable capacitance grouping and a third adjustable capacitance grouping,  
4 each adjustable capacitance grouping comprising at least one tunable  
5 capacitor and a bias port; and  
6 a first lead and a second lead, the leads configured to couple the bridge circuit with a  
7 coupling element and a shunt element.

1 17. The tuning circuit of claim 16, wherein the tunable capacitor comprises a thin-film  
2 barium strontium titanate ("BST") capacitor.

1 18. The tuning circuit of claims 16, wherein at least one of adjustable capacitance groups  
2 further comprises a bulk capacitor.

1 19. The tuning circuit of claim 18, wherein the tunable capacitor is set to a value  
2 substantially equivalent to the bulk capacitor in that adjustable capacitance group.

1 20. The tuning circuit of claim 16, wherein the bias port is configured to receive a bias  
2 voltage.

1 21. The tuning circuit of claim 20, wherein the bias port further comprises a bias  
2 resistance.

1 22. A tuning circuit comprising:  
2 a bridge circuit comprising a first adjustable capacitance grouping, a second  
3 adjustable capacitance grouping and a third adjustable capacitance grouping,  
4 each adjustable capacitance grouping comprising at least one tunable thin-film  
5 barium strontium titanate ("BST") capacitor and a bias port, the bias port  
6 configured to couple a bias voltage; and  
7 a first lead and a second lead, the leads configured to couple the bridge circuit with a  
8 coupling element and a shunt element.

1 23. The tuning circuit of claim 22, wherein at least one adjustable capacitance group  
2 further comprises a bulk capacitor.

1 24. The tuning circuit of claim 23, wherein the tunable BST capacitor is set to a value  
2 substantially equal to a value of the bulk capacitor in that adjustable capacitance group.

1 25. The tuning circuit of claim 22, wherein at least one adjustable capacitance group  
2 further comprises a second tunable thin-film BST capacitor.

1 26. The tuning circuit of claim 24, wherein the second tunable thin-film BST capacitor is  
2 set to a value substantially equal to the first tunable thin-film BST capacitor in that adjustable  
3 capacitance group.

1 27. The tuning circuit of claim 22, wherein the bias port further comprises a bias resistor.

1 28. A tuning circuit comprising:  
2 a means for reactance adjustment within an electrical circuit, further comprising a  
3 first means for adjusting capacitance, a second means for adjusting  
4 capacitance, and a third adjusting capacitance, each means for adjusting  
5 capacitance comprising

6                   at least one means for capacitance having a high intrinsic capacitance density  
7                   and a field-dependent electrical permittivity, and  
8                   a means for receiving a bias voltage; and  
9                   a means for coupling the means for reactance adjustment with a means for coupling  
10                  and a means for shunting in the electrical circuit.

1    29.    The tuning circuit of claim 28, wherein the means for coupling includes a first port  
2           and a second port.

1    30.    The tuning circuit of claim 28, wherein the means for capacitance comprises a thin-  
2           film barium strontium titanate ("BST") capacitor.

1    31.    The tuning circuit of claim 29, wherein the means for capacitance further comprises a  
2           second thin-film BST capacitor.

1    32.    The tuning circuit of claim 31, wherein the second tunable thin-film BST capacitor is  
2           set to a value substantially equal to the first tunable thin-film BST capacitor in the means for  
3           capacitance.

1    33.    The tuning circuit of claim 28, wherein the means for receiving a bias voltage further  
2           comprises a bias resistor.